

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

- Claim 1. (Previously Presented) A photo detector array comprising:
- one or more detector layers of semiconductor material, each detector layer between contact layers of semiconductor material, thereby defining a stack of layers having a front side and a back side with at least one pixel formed therein; and
- a waffle-type light-coupling grating formed on the backside of the stack, the grating having a pattern of wells etched out from the backside, wherein the wells reflect a substantial portion of light coming into the array so as to disperse that light through the one or more detector layers, thereby facilitating absorption, wherein a surface area of said wells is about approximately equal to a remaining surface area of said backside, and a pitch of said wells is about one wavelength of a center wavelength of interest.
- Claim 2. (Previously Presented) The array of claim 1 wherein the pattern of the waffle-type light-coupling grating has a geometry optimized for said center wavelength of interest, and an orientation ranging from about 20 to 70 degrees with respect to a major edge of said pixel.
- Claim 3. (Previously Presented) The array of claim 2 wherein the geometry includes a well depth of about one quarter wavelength of the center wavelength of interest.
- Claim 4. (Previously Presented) The array of claim 2 wherein the orientation of the grating is about 45 degrees with respect to a major edge of said pixel.
- Claim 5. (Previously Presented) The array of claim 1 wherein the detector layers each have a different light absorption versus wavelength response curve thereby enabling a multicolor photo detector.

Claim 6. (Previously Presented) The array of claim 1 wherein edges of the one or more detector layers are reflectively coated so as to provide, in conjunction with the waffle-type light-coupling grating, a photon-in-a-box configuration for containing light within each pixel of the array.

Claim 7. (Original) The array of claim 1 wherein the waffle-type light-coupling grating includes a hybrid metal layer having both ohmic and reflective qualities.

Claim 8. (Original) The array of claim 1 wherein each of the one or more detector layers is about one micron or less in thickness.

Claim 9. (Previously Presented) The array of claim 1 wherein each of the contact layers is electrically coupled to a respective electrical contact on the backside, thereby facilitating hybridization when the array is connected to a substrate configured with supporting electrical circuitry.

Claim 10. (Original) The array of claim 1 wherein the array is configured as a strained-InGaAs/AlGaAs QWIP structure having a limited number of quantum wells so as to enable exploitation of avalanche effects.

Claim 11. (Currently Amended) A photo detector array comprising:
one or more detector layers of semiconductor material, each detector layer between contact layers of semiconductor material, thereby defining a stack of layers having a front side and a backside and forming at least one pixel therein;
a waffle-type light-coupling grating formed on the backside of the stack having a plurality of wells etched in said backside with a hybrid metal layer having both ohmic and reflective qualities coating said grating, and having a pattern that reflects a substantial portion of light coming into the array so as to disperse that light through the one or more detector layers, thereby facilitating absorption, a surface area of said wells is about approximately equal to a remaining surface area of said backside and a pitch of said wells is about one wavelength of a center

wavelength of interest, wherein the pattern of the waffle-type light-coupling grating has a geometry optimized for a center wavelength of interest, and an orientation ranging from about 20 to 70 degrees with respect to a major edge of said pixel, and

wherein edges of the one or more detector layers are reflectively coated so as to provide, in conjunction with the light-coupling grating, a photon-in-a-box configuration for containing light within each pixel of the array.

Claim 12. (Previously Presented) The array of claim 11 wherein the pattern of the waffle-type light-coupling grating has an irregular geometry consists of at least one of a varied well depth, and a varied spacing between the wells.

Claim 13. (Previously Presented) The array of claim 11 wherein the pattern of the light-coupling grating has an orientation of about 45 degrees with respect to said major edge of said pixel.

Claim 14. (Previously Presented) The array of claim 11 wherein the detector layers each have a different light absorption versus wavelength response curve thereby enabling a multicolor photo detector.

Claim 15. (Original) The array of claim 11 wherein each of the one or more detector layers is about one micron or less in thickness.

Claim 16. (Previously Presented) The array of claim 11 wherein each of the contact layers is electrically coupled to a respective electrical contact on the backside, thereby facilitating hybridization when the array is connected to a substrate configured with supporting electrical circuitry.

Claim 17. (Previously Presented) A photo detector array comprising:
one or more detector layers of semiconductor material, each detector layer between
contact layers of semiconductor material, thereby defining a stack of layers of a

multicolor photo detector having a front side and a back side and forming at least one pixel therein;

a rotated waffle-type light-coupling grating formed on the backside of the stack and having a plurality of wells etched into an upper level, said wells having a plurality of well sidewalls and a lower level, and wherein the light-coupling grating having a pattern that reflects a substantial portion of light coming into the array so as to disperse that light through the one or more detector layers, thereby facilitating absorption, wherein a surface area of said wells is about approximately equal to a remaining surface area of said backside, and a pitch of said wells is about one wavelength of a center wavelength of interest.

Claim 18. (Previously Presented) The array of claim 17 wherein the rotated light-coupling grating has an orientation of about 45 degrees with respect to a major edge of said pixel.

Claim 19. (Previously Presented) The array of claim 17 wherein the light-coupling grating includes a hybrid metal layer having both ohmic and reflective qualities coating said grating, and edges of each of said detector layers are reflectively coated so as to provide, in conjunction with the light-coupling grating, a photon-in-a-box configuration for containing light within each pixel of the array.

Claim 20. (Previously Presented) The array of claim 17 wherein the array is configured as a strained-InGaAs/AlGaAs QWIP structure having a limited number of quantum wells so as to enable exploitation of avalanche effects.